

CLAIMS

What is claimed is:

1. A digital media communications and control system comprising:
 - a. a plurality of audio devices, each of the devices including a device
5 interface module for communication of digital audio data and control data
from at least one of the devices to at least one other of the devices;
 - b. a universal data link operatively connected to each of the device interface
modules; and
 - c. the device interface modules and universal data links are operative in
10 combination to connect the devices together in the system and provide full
duplex communication of the digital audio data and control data between
the devices.
2. The system of Claim 1 wherein each data link comprises a single cable
connecting a pair of the devices.
- 15 3. The system of Claim 1 further comprising a network hub and wherein at least
some of the data links comprise network cables connecting the device interface
modules to the hub in a network topology whereby the digital audio data and
control data that are communicated over the data links are accessible by each of
the devices linked to the hub without having a direct connection between
20 devices.
4. The system of either Claim 2 or Claim 3 wherein the cable includes means for
providing phantom power to the devices.

5. The system of Claim 3 wherein each of the network cables comprises a conventional CAT5 network cable terminated by conventional RJ-45 connectors.
6. The system of either of Claims 1, 3, or 5 wherein the audio devices comprise audio transducer devices, the transducer devices including one or more devices
5 selected from a group comprising musical instruments, microphones, headphones, audio speakers, and audio recording devices.
7. The system of Claim 6 wherein the audio devices further comprise audio controller devices, the controller devices including one or more devices selected from a group comprising audio amplifiers and system control devices.
- 10 8. The system of Claim 1 wherein the control data includes device identification data that identifies each of the devices to other of the devices connected to the system.
9. The system of Claim 8 wherein the device identification data includes a device name selected by a user of the device.
- 15 10. The system of Claim 8 wherein the device interface modules and data links are adapted to allow the audio devices to be connected and identified to the system while the system is active.
11. The system of Claim 8 wherein the control data includes device control data whereby one of the devices can control one or more of other devices connected to
20 the system.
12. The system of Claim 11 wherein the control data further includes system configuration data.

13. The system of Claim 12 wherein the control data further includes device status data.

14. The system of Claim 1 wherein the audio devices are operative to generate user data associated with a specific user of that device and the device interface modules and data links are operative to communicate the user data to other devices connected to the system.

15. The system of Claim 14 wherein the audio data communicated between the devices is packed in system data packets.

16. The system of Claim 15 wherein the system data packets also contain the control data.

17. The system of Claim 16 wherein each of the system data packets comprises a plurality of data channels including a header, a plurality of audio data channels containing the digital audio data, a user data channel containing the user data, and a control data channel containing the control data.

18. The system of Claim 17 wherein the system data packets further comprise a CRC field for providing cyclic redundancy checking of the system data packet.

19. The system of Claim 17 wherein the data packet comprises 32 audio data channels.

20. The system of Claim 19 wherein the audio channels contain the digital audio data in 16, 24, 28, or 32-bit format.

21. The system of Claim 19 wherein one or more of the audio channels can be dynamically reassigned by the system to carry data other than audio data.

22. The system of Claim 15 wherein the data frames are continuously transmitted between devices in accordance with a packet timing signal that is synchronized to an audio sampling rate associated with the digital audio data.
23. The system of Claim 22 wherein the audio sampling rate is selected from a group comprising 32k, 44.1k, 48k, 96k, and 192k.
24. The system of Claim 23 wherein each of the audio devices can operate at a different one of the sampling rates whereby a system can have data links operating at different sampling rates.
25. The system of Claim 22 wherein the packet timing signal is generated by one of the device interface modules.
26. The system of Claim 17 wherein the control data channel can contain non-system control data.
27. The system of Claim 26 wherein the non-system control data comprises MIDI control data.
28. The system of Claim 17 wherein the plurality of data channels in each system data packet can be reassigned by the system for carrying different types of data in accordance with the requirements of a specific device connected to the system.
29. The system of Claim 28 wherein certain of the data channels in the system data packets are assigned by default to carry certain types of the data when a pre-determined type of audio device is connected to the system.
30. The system of Claim 3 wherein the device interface modules are operative to direct digital audio signals and control signal generated by a source audio device

to one or more target audio devices connected to the system.

31. The system of Claim 30 wherein the target devices are changeable by a user while the source and target audio devices are actively connected to the system.

32. The system of Claim 1 wherein functions performed by one of the audio devices
5 can be shared by more than one of the other devices connected to the system.

33. A musical performance system comprising:

a. a musical instrument including a first device interface module operative to convert audio signals generated by the instrument into digital audio data and to generate control data associated with the instrument;

10 b. an audio amplifier including a second device interface module operative to receive the digital audio data and the control data; and

c. a first data link operatively connecting the first and second device interface modules and adapted for bi-directional communication of the digital audio data and control data.

15 34. The system of Claim 33 further comprising an audio speaker including a third device interface module operatively connected to the audio amplifier by a second data link.

35. The system of Claim 34 further comprising a system control device including a fourth device interface module operatively connected to the system by a third
20 data link, the system control device operative to generate control data for communication to the audio amplifier.

36. The system of Claim 34 wherein the first and second data links each comprise a

single data cable.

37. The system of Claim 36 wherein the audio speaker includes an audio power amplifier and the system further comprises a device power source electrically connected to the audio speaker over the second data link.

5 38. The system of Claim 35 further comprising a network hub and wherein the data links are electrically connected to the hub such that the audio digital data and control data is accessible by each device interface module connected to the system.

39. The system of Claim 35 wherein the musical instrument is a guitar.

10 40. A musical instrument comprising:

a. an audio transducer for generating analog audio data;
b. a device interface module operative to convert the analog audio data into digital audio data and to provide the digital audio data and system control data at a musical instrument output;

15 c. the musical instrument output including an instrument connector adapted for connection to a system data link whereby the device interface module and data link can cooperate to provide bi-directional communication of digital audio data and system control data over the data link.

20 41. The musical instrument of Claim 40 wherein the control data includes instrument identifier data.

42. The musical instrument of Claim 41 wherein the instrument identifier data

includes an instrument name selectable by a user of the instrument.

43. The musical instrument of Claim 42 wherein the instrument identifier data includes data describing functional characteristics of the instrument.

44. The musical instrument of Claim 43 wherein the instrument connector
5 comprises a single cable connector.

45. The musical instrument of Claim 44 wherein the cable connector comprises a network cable connector.

46. The musical instrument of Claim 45 wherein the network cable connector is an RJ-45 jack.

10 47. The musical instrument of Claim 44 further comprising power supply means to receive instrument power from an external connection to the cable connector.

48. The musical instrument of Claim 40 wherein the instrument is a guitar and the audio transducer is a guitar pick-up.

49. A method of arranging a plurality of electronic audio devices in an audio system
15 comprising:

a. providing each of the audio devices with a device interface module adapted for communication of digital audio data generated by one or more of the devices connected to the system and for storage and communication of control data associated with that audio device;

20 b. operatively connecting the device interface modules over one or more data links, the data links adapted for full duplex communication of the digital audio data and control data to and from each device; and

- c. directing the digital audio data for use by one or more specified devices connected to the system.

50. The method of Claim 49 further comprising communicating the digital audio data and control data across the data links in discrete data packets.

- 5 51. The system of Claim 50 further comprising synchronizing the communication of the data packets to an audio sampling rate.

52. The method of Claim 51 further comprising varying the audio sampling rate among the different data links in accordance with requirements of specific audio devices connected to the data links.

- 10 53. The method of Claim 49 further comprising providing a means for allowing a user of an audio device to select a name for that device and to include the selected device name in the control data communicated by the corresponding device interface module.

54. The method of Claim 50 further comprising providing 16 channels of up to 32-bit
15 audio data in each data packet.

55. The method of Claim 54 further comprising providing user data in each data packet.

56. The method of Claim 54 further comprising connecting a plurality of the data links using network cables connected to a network hub.